NOTES FROM PACIFIC COAST OBSERVATORIES

Spectrum of the Crab Nebula

A spectrogram of this object, made between the dates November 5, 1918, and February 3, 1919, altho the result of forty-eight hours exposure is disappointingly weak. This is probably due in large part to the very bad seeing conditions that prevailed during eighty per cent of the exposure time. It seems worth while, however, to state the following points, which appear to be borne out by this spectrogram.

1. The spectrum is continuous, crossed by bright lines.

2. The light is made up of relatively more continuous spectrum for the brightest part of the nebula than for the other portions adjacent to it. The maximum intensity or effective wave-length of this continuous spectrum is about λ4600. It is too weak to give any clue as to spectral type.

3. The bright lines, at the point where they record their maximum intensity, have the following wave-lengths (uncorrected for radial velocity):

λ3719, 3748, 4681, 4948, 4995, 5036.

Other lines were also measured, but because of their weakness are not included. Giving weights to the first, third, fourth, and fifth, according to their quality, a radial velocity of −600 km/sec is found. This refers to a point about 55″ west of the center. Approximately the same distance to the east, the third and fifth line in the above list (the first and fourth could not be measured) give in round numbers a radial velocity of −1000 km/sec. The last line in the list shares in the greater shift to the violet at this point in the nebula.

If wave-lengths of the two lines λ3748 and λ5036 are corrected for an assumed radial velocity of −600 km/sec, they turn out to be λ3755 and λ5048. Wright's list of bright nebular lines contains none possible of identification with these two. They fall close to two helium lines, which are, however, in different series, and among the faintest lines in their respective series; and, furthermore, no other identifications with helium can be made. If we assume them to be the characteristic nebular lines λ3728 and λ5007 displaced to the red, their shifts would mean radial velocities of +1620 and +1750 km/sec, respectively, which in this case may

be called good agreement with each other, considering the small dispersion and the fact that both lines lie outside the region of good focus.

4. Unfortunately, this spectrogram is too weak to justify any statement relative to the reality of a phenomenon similar to the Stark Effect, which Slipher evidently connects with the above apparently double lines.

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TWO NEW NOVAE IN THE ANDROMEDA NEBULA

Three half-hour exposures, made with the 60-inch reflector, one on January 4 and two on January 5, 1919, reveal two additional novae. These are numbered 12 and 13, numbers 10 and 11 having been reported in the December (1918) number of these PUBLICATIONS. Rough positions with reference to the nucleus and the approximate magnitudes are as follows for the second plate of January 5th.

No.	Co-ordinates		Magnitude
12	235″ N	85″ W	17.0
13	275″ S	220″ W	17.4

The exposure of January 4th was made under extremely bad seeing conditions and the plate cannot be used to determine variation of magnitude. It merely serves as an additional check upon the reality of the images. The first plate of January 5th is of poor quality, but number 12 certainly appears to be no brighter on it and may even be slightly fainter than on the following plate. Number 13 shows no change on the plates of January 5th. Number 12 is located in the patchy area which is so pronounced to the northwest of the nucleus. Number 13 is surrounded by the soft milky nebulosity along the major axis to the southwest of the nucleus.

Two similarly exposed plates were obtained on February 3, 1919. Number 12 is present on both plates and is estimated at about magnitude 17.3. Number 13 appears upon neither plate altho stars of the eighteenth magnitude are almost certainly present.

From the magnitude estimates made upon six novae in the Andromeda nebula, Nos. 2, 3, 4, 5, 6, and 10 (the others furnish no data), the rate of fall per day is found to average 0.05 of a magnitude. This is not at all inconsistent with the average rate for galactic novae. It will be seen that the change recorded for